Report for 2004GU51B: A water quality study of river and ground water resources in Kosrae, FSM.

There are no reported publications resulting from this project.

Report Follows

Project Title
Qualitative examination of groundwater from Yap and some of its neighboring islands

Problem and Research Objectives
Annual rain fall in Kosrae, FSM has declined from over 350 inches, 20 years ago to less than 200 inches in recent years. The population of the FSM is growing at 3% per annum. Population pressure is affecting the natural forests and watershed areas. As a result of the climatic change and human impact on the forests, some streams that traversed Kosrae have disappeared and others have limited water flow. The majority of the people of Kosrae still rely on surface water for their domestic requirements. Although, compact funds and other assistances from the US Government have established water catchments and safe toilets with septic tanks, water quality assessment and assurance programs are not yet in place in Kosrae. Only a part of one out of the four municipalities in Kosrae has an established ground water supply. However, the ground water quality has never been determined. A previous study has shown high levels of mercury from some water samples in Kosrae. Trained manpower and other resources like equipment and supplies are in short supply in Kosrae limiting the water quality analysis and assurance plans. Apparently very little qualitative data is currently available to formulate necessary treatments required.

Reduced rainfall and low rate of water flow may be making concentration of dissolved chemicals in the river water high. Abundance of rodents and wild pigs in the forests of Kosrae is a sure source of contaminating nutrients and fecal bacteria in to the river water. Waste from piggeries and other agriculture activities (chemical fertilization and pesticide application) are other known sources of water pollution.

The objectives of this study were to (i) conduct a quality assessment of water sources collected from different localities of Kosrae State (ii) establish baseline information on the present conditions of the vital resource, and (iii) train Kosrae State EPA personnel in carrying out various water qualities testing procedures.

Methodology
Samples from household systems supplied by municipal supplies or roof catchment, major rivers and dams in four municipalities in Kosrae were subjected to testing for total coliform, E. coli and Enterococci. This testing was done using the Idexx Colilert™ system for coliform and E. coli. And Idexx Enterolert™ for Enterococci. Results were reported in most probable number (mpn) units. The actual water analyses were performed at the Agricultural Experiment Station Laboratory (MPPRC) in Kosrae. A total of 265 samples were analyzed with results as shown in figure 1.

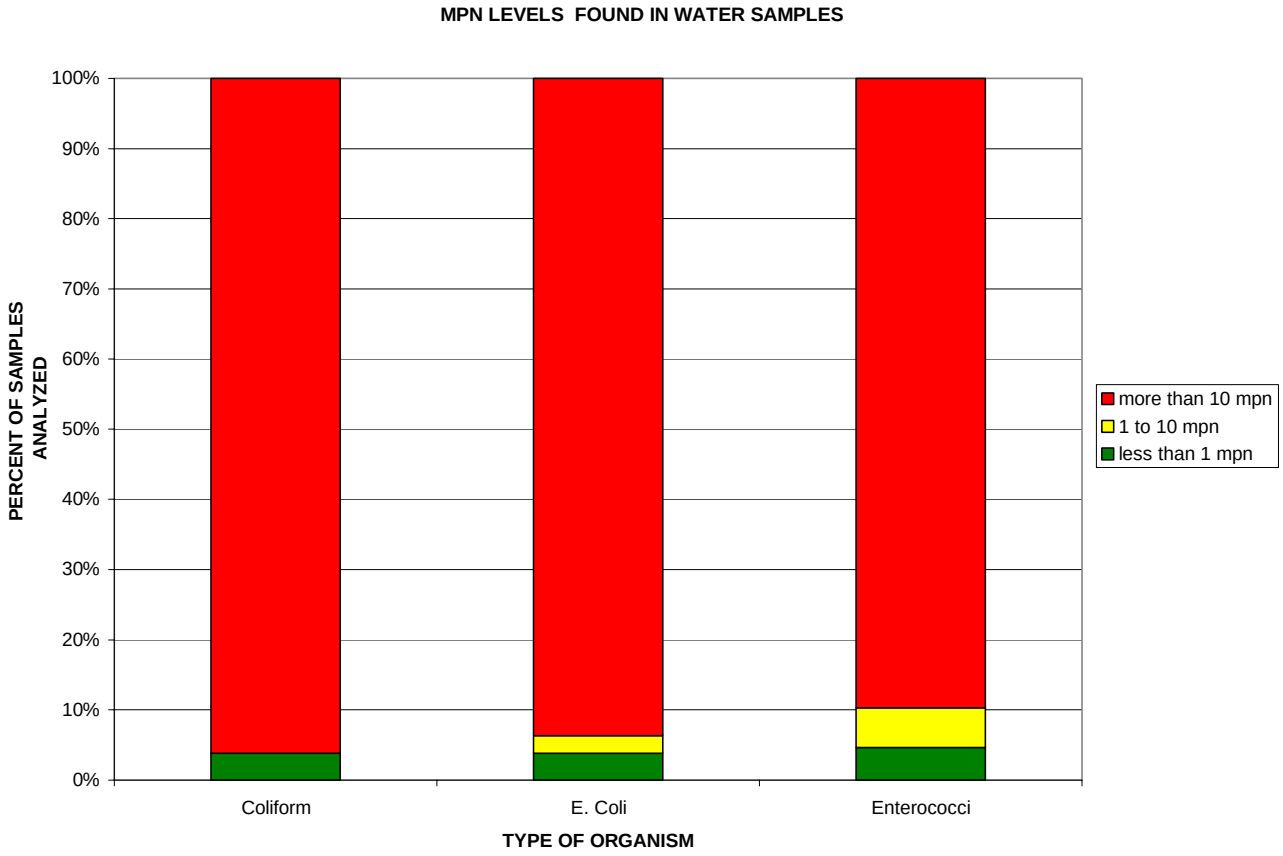

Figure 1. Levels of Coliforms and Enterococci found in the samples tested

Principal Findings and Significance

The relative safety of a water supply can be classified based on bacterial contamination level. A high quality system would have bacterial levels less than 1 mpn, a, medium quality system would have levels in the range of 1 to 10 mpn, and a low quality system would have levels greater than 10 mpn. The testing so far has shown that 96% of the water supplies tested showed total coliform levels greater than 10 mpn (lowest quality), with none of the tests falling in the 1 to 10 mpn (medium quality) range. Only 4 % fell in the less than 1 mpn (high quality). range. The E. coli testing so far has shown that 94% of the water supplies tested showed total coliform levels greater than 10 mpn (lowest quality), with 2% of the tests falling in the 1 to 10 mpn (medium quality) range. Only 4 % fell in the less than 1 mpn (high quality). range. The enterococci testing so far has shown that 90% of the water supplies tested showed total enterococci levels greater than 10 mpn (lowest quality), with 5% of the tests falling in the 1 to 10 mpn (medium quality) range. Only 5 % fell in the less than 1 mpn (high quality). Range. These results

indicate that a vast majority of the drinking water supplies may be unsafe for human consumption under untreated conditions. Since none of the water supplies in Kosrae are treated one can say that the vast majority of water presently being consumed by local residents may be unsafe for human consumption. The results so far indicate that the government/utility needs to implement a disinfection program (chlorination) for distributed water supplies. Lacking that, and in the case of individually collected sources, the people need to institute personal disinfection programs such as chlorination with Clorox™ or boiling

This study yielded important water quality data for different regions of the island. The results will be useful for Kosrae State Administration/ Department of Health formulate appropriate treatment systems required. Since little water quality data exists for in Kosrae, this project was a major step forward in providing a database for future comparative purposes. The data will be useful for people and policy makers alike to come up with better solutions for the supply of potable water to the public. This will be a useful step to reduce the physical hardship of the people suffering from water borne diseases. It will also reduce the financial burden of the local government in providing health care both on and off island to those suffering from water borne diseases. The outcome and further action by the concerned department will help to provide necessary advise to tourists on the water quality in Kosrae (mostly Americans) visiting the island every year.